CRYOMILLED ALUMINUM ALLOYS AND COMPONENTS EXTRUDED AND FORGED THEREFROM

ABSTRACT OF THE DISCLOSURE

High strength aluminum alloy powders, extrusions, and forgings are provided in which the aluminum alloys exhibit high strength at atmospheric temperatures and maintain high strength and ductility at extremely low temperatures. The alloy is produced by blending about 89 atomic% to 99 atomic% aluminum, 1 atomic% to 11 atomic% of a secondary metal selected from the group consisting of magnesium, lithium, silicon, titanium, zirconium, and combinations thereof, and up to about 10 atomic% of a tertiary metal selected from the group consisting of Be, Ca, Sr, Ba, Ra, Sc, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Y, Nb, Mo, Tc, Ru, Rh, Pd, Ag, Cd, W, and combinations thereof. The alloy is produced by nanostructure material synthesis, such as cryomilling, in the absence of refractory dispersoids. The synthesized alloy is then canned, degassed, consolidated, extruded, and optionally forged into a solid metallic component. Grain size within the alloy is less than 0.5 μm, and alloys with grain size less than 0.1 μm may be produced.